

IN THE CLAIMS:

1 1. (CURRENTLY AMENDED) A switch for a computer network, the switch to receive
2 ATM cells from the computer network, comprising:

3 a switching fabric configured to receive a cell at an input port, said switching fab-
4 ric selecting a route there-through for said cell to an output port;

5 at least one queue within said switching fabric, said queue having an associated
6 threshold, said switching fabric configured to determine the number of cells present in
7 said queue, said switching fabric further configured to determine if the next arriving cell
8 for said at least one queue fills said queue above said threshold, and in the event that said
9 at least one queue is filled above said threshold, then write a flag bit within said cell to a
10 "set" state; and

11 a traffic manager configured to compute a ratio of cells having said flag bit set to
12 a total number of cells received at an output port, and in response to a value of said ratio,
13 either discard said cell or forward said cell onto an output link of said computer network,
14 said traffic manager configured to select a cell to be discarded on a random basis and ab-
15 sent access to the number of cells present in the at least one queue.

1 2. (ORIGINAL) The switch of claim 1 further comprising:

2 an ASIC chip having said traffic manager implemented therein.

1 3. (ORIGINAL) The switch of claim 1 wherein said flag bit further comprises:

2 an EFCI bit of said ATM cell.

1 4. (ORIGINAL) The switch of claim 1 further comprising:

2 a switch fabric card, said switch fabric card having switching fabric chips and said
3 traffic manager mounted thereon.

1 5. (PREVIOUSLY PRESENTED) The switch of claim 1 further comprising:

2 an IP linecard, said IP linecard configured to receive TCP/IP computer packets
3 from a computer network and forward ATM cells to said switching fabric.

1 6. (PREVIOUSLY PRESENTED) The switch of claim 1 further comprising:

2 an IP linecard, said IP linecard configured to receive ATM cells from said switch-
3 ing fabric and forward TCP/IP computer packets onto a computer network.

1 7. (CURRENTLY AMENDED) A switch for a computer network, the switch to receive
2 IP packets from the computer network, comprising:

3 a line card to convert said IP packets to fixed length segments;

4 a switching fabric configured to receive said fixed length segments from said line
5 card at an input port, said switching fabric configured to select a route there-through for
6 said fixed length segment to an output port;

7 at least one queue within said switching fabric, said queue having an associated
8 threshold, said switching fabric configured to determine the number of fixed length seg-
9 ments present in said queue, said switching fabric configured to determine if the next ar-
10 riving fixed length segment for said at least one queue fills said queue above said thresh-
11 old, and in the event that said at least one queue is filled above said threshold, then write
12 a flag bit within said fixed length segment to a "set" state;

13 a traffic manager configured to compute a ratio of fixed length segments having
14 said flag bit set to a total number of fixed length segments received at an output port, and

15 in response to a value of said ratio either discard said fixed length segment or forward
16 said fixed length segment onto an output link of said computer network, said traffic man-
17 | ager configured to select a fixed length segment to be discarded on a random basis and
18 | absent access to the number of cells present in the at least one queue.

1 8. (PREVIOUSLY PRESENTED) The switch as in claim 7 further comprising:

2 said fixed length segment is an ATM cell and said flag bit is an EFCI bit of said
3 ATM cell.

1 9. (CURRENTLY AMENDED) A switch for a computer network, the switch to receive
2 data cells from the computer network, comprising:

3 a switching fabric configured to receive a cell at an input port, said switching fab-
4 ric configured to select a route there-through for said cell to an output port;

5 at least one queue within said switching fabric, said queue having an associated
6 threshold, said switching fabric configured to determine the number of cells present in
7 said queue, said switching fabric configured to determine if the next arriving cell for said
8 at least one queue fills said queue above said threshold, and in the event that said at least
9 one queue is filled above said threshold, then write a flag bit within said cell to a "set"
10 state;

11 means for computing a ratio of cells having said flag bit set to a total number of
12 cells received at an output port, and in response to a value of said ratio either discarding
13 said cell or forwarding said cell onto an output link of said computer network, said means
14 | configured to select a cell to be discarded on a random basis and absent access to the
15 | number of cells present in the at least one queue.

1 | 10. (CURRENTLY AMENDED) The ~~apparatus-switch~~ as in claim 9 wherein said data
2 | cells further comprise ATM cells.

1 | 11. (CURRENTLY AMENDED) The ~~apparatus-switch~~ as in claim 9 wherein said data
2 | cells further comprise fixed length data cells.

1 | 12. (CURRENTLY AMENDED) The ~~apparatus-switch~~ as in claim 9 wherein said data
2 | cells further comprise IP cells.

1 | 13. (CURRENTLY AMENDED) A method of operating a network switch, said network
2 | switch receiving fixed length segments from a computer network, comprising:

3 | receiving a fixed length segment at an input port of a switching fabric, said
4 | switching fabric selecting a route through said switching fabric from an input port to an
5 | output port of said switching fabric for said fixed length segment;

6 | maintaining at least one queue of fixed length segments within said switching fab-
7 | ric, said queue having an associated threshold,

8 | determining the number of fixed length segments present in said queue, and de-
9 | termining if the next arriving fixed length segment for said at least one queue fills said
10 | queue above said threshold, and in the event that said at least one queue is filled above
11 | said threshold, then writing a flag bit within said fixed length segment to a "set" state;

12 | computing a ratio of fixed length segments having said flag bit set to a total num-
13 | ber of fixed length segments received at an output port, and in response to a value of said
14 | ratio either discarding said fixed length segment or forwarding said fixed length segment
15 | onto an output link of said computer network, said discarding step selecting a fixed
16 | length segment to be discarded on a random basis and absent access to the number of
17 | cells present in the at least one queue.

1 14. (ORIGINAL) The method of claim 13 further comprising:

2 using as said fixed length segment an ATM cell, and using as said flag bit an
3 EFCI bit of said ATM cell.

1 15. (ORIGINAL) The method of claim 13 further comprising:

2 using a Random Early Detection (RED) computational method to select said fixed
3 length segment to be discarded on a random basis.

1 16. (CURRENTLY AMENDED) A method of operating a network switch, said network
2 switch receiving TCP/IP computer packets from a computer network, comprising:

3 converting said TCP/IP packets to fixed length packets, said switching fabric se-
4 lecting a route through said switching fabric from an input port to an output port of said
5 switching fabric for said fixed length segment;

6 maintaining at least one queue of fixed length segments within said switching fab-
7 ric, said queue having an associated threshold,

8 determining the number of fixed length segments present in said queue, and de-
9 termining if the next arriving fixed length segment for said at least one queue fills said
10 queue above said threshold, and in the event that said at least one queue is filled above
11 said threshold, then writing a flag bit within said fixed length segment to a "set" state;

12 computing a ratio of fixed length segments having said flag bit set to a total num-
13 ber of fixed length segments received at an output port, and in response to a value of said
14 ratio either discarding said fixed length segment or forwarding said fixed length segment
15 onto an output link of said computer network, said discarding step selecting a fixed
16 length segment to be discarded on a random basis and absent access to the number of
17 cells present in the at least one queue.

1 17. (ORIGINAL) The method of claim 16 further comprising:

2 using as said fixed length segment an ATM cell, and using as said flag bit an
3 EFCI bit of said ATM cell.

1 18. (ORIGINAL) The method of claim 16 further comprising:

2 using a Random Early Detection (RED) computational method to select said fixed
3 length segment to be discarded on a random basis.

1 19. (CURRENTLY AMENDED) A computer readable media containing instructions for
2 operating a network switch, said network switch receiving fixed length segments from a
3 computer network, the instructions comprising instructions configured to:

4 receive a fixed length segment at an input port of a switching fabric, and to select
5 a route through said switching fabric from an input port to an output port of said switch-
6 ing fabric for said fixed length segment;

7 maintain at least one queue of fixed length segments within said switching fabric,
8 said queue having an associated threshold,

9 determine the number of fixed length segments present in said queue, and deter-
10 mine if the next arriving fixed length segment for said at least one queue fills said queue
11 above said threshold, and in the event that said at least one queue is filled above said
12 threshold, then write a flag bit within said fixed length segment to a "set" state;

13 compute a ratio of fixed length segments having said flag bit set to a total number
14 of fixed length segments received at an output port, and in response to a value of said ra-
15 tio either discard said fixed length segment or forward said fixed length segment onto an
16 output link of said computer network, said instructions configured to select fixed length
17 segment to be discarded on a random basis and absent access to the number of cells pre-
18 sent in the at least one queue.

1 20. (CURRENTLY AMENDED) Electromagnetic signals propagating on a computer
2 network, said electromagnetic signals carrying information for operating a network
3 switch, said network switch receiving fixed length segments from a computer network,
4 the information comprising instruction configured to:

5 receive a fixed length segment at an input port of a switching fabric, and to select
6 a route through said switching fabric from an input port to an output port of said switch-
7 ing fabric for said fixed length segment;

8 maintain at least one queue of fixed length segments within said switching fabric,
9 said queue having an associated threshold,

10 determine the number of fixed length segments present in said queue, and deter-
11 mine if the next arriving fixed length segment for said at least one queue fills said queue
12 above said threshold, and in the event that said at least one queue is filled above said
13 threshold, then write a flag bit within said fixed length segment to a "set" state;

14 compute a ratio of fixed length segments having said flag bit set to a total number
15 of fixed length segments received at an output port, and in response to a value of said ra-
16 tio either discard said fixed length segment or forward said fixed length segment onto an
17 output link of said computer network, said instructions configured to select a fixed length
18 segment to be discarded on a random basis and absent access to the number of cells pre-
19 sent in the at least one queue.

1 21. (CURRENTLY AMENDED) An ATM switch for receiving ATM cells from a com-
2 puter network, the ATM switch comprising:

3 a switching fabric configured to receive a-cells at an input port, the switching fab-
4 ric configured to selecting a route for the cells to an output port;

5 a queue within the switching fabric, the queue having an associated threshold, the
6 switching fabric configured to determine the number of cells present in the queue, the
7 switching fabric further configured to determine that the queue is filled above a the

8 | threshold and in response set congestion indicator fields within a newly arrived cells at
9 the switching fabric;

10 a traffic manager, external to the switching fabric, the traffic manager configured
11 to monitor cells received at the output port and configured to discard cells, in response to
12 a ratio of cells having the congestion indicator field set to a total number of cells; and

13 wherein the number of cells present in the queue is inaccessible to the traffic
14 manager.

1 22. (PREVIOUSLY PRESENTED) The switch of claim 21 further comprising:

2 an ASIC chip having said traffic manager implemented therein.

1 23. (NEW) The switch of claim 21 wherein the traffic manager is further configured to
2 apply a Random Early Detection (RED) algorithm to the ratio of cells having the congestion
3 indicator field set to the total number of cells.

1 24. (NEW) The switch of claim 21 wherein the traffic manager is further configured to
2 calculate a discard probability from the ratio of cells having the congestion indicator field
3 set to the total number of cells.

1 25. (NEW) The switch of claim 24 wherein the traffic manager is further configured to
2 compare the discard probability to a random number, and in response to the comparison,
3 to determine whether a particular cell should be dropped.

1 26. (NEW) The switch of claim 24 wherein the traffic manager is further configured to
2 adjust the discard probability in response to a particular cell being of a particular class of
3 traffic.

1 27. (NEW) The switch of claim 21 wherein the ratio of cells having the congestion indi-
2 cator field set to the total number of cells is determined for a selected time period.

1 28. (NEW) A method comprising:

2 receiving cells at an input port of a switching fabric;

3 selecting a route for the cells to an output port of the switching fabric, the route
4 passing through a queue;

5 determining the number of cells present in the queue, and if the queue is filled
6 above a threshold setting a congestion indicator field within newly arrived cells;

7 monitoring cells received at the output port and deciding that cells should be dis-
8 carded, in response to a ratio of cells having the congestion indicator field set to a total
9 number of cells; and

10 wherein the number of cells present in the queue is not accessed in the steps of
11 monitoring and deciding.

1 29. (NEW) The method of claim 28 wherein the step of deciding further comprises:

2 applying a Random Early Detection (RED) algorithm to the ratio of cells having
3 the congestion indicator field set to the total number of cells.

1 30. (NEW) The method of claim 28 wherein the step of deciding further comprises:

2 calculating a discard probability from the ratio of cells having the congestion in-
3 dicator field set to the total number of cells.

1 31. (NEW) The method of claim 30 wherein the step of deciding further comprises:
2 comparing the discard probability to a random number, and
3 determining, in response to the comparison, whether a particular cell should be
4 discarded.

1 32. (NEW) The method of claim 30 wherein the step of deciding further comprises:
2 adjusting the probability value in response to a particular cell being of a certain
3 class of traffic.

1 33. (NEW) The method of claim 28 further comprising:
2 discarding cells by a line card.